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BRITISH GUYANA.

NATIVE HUT AND CANOES.

V. The Demerara and Berbice Rivers.

Having described the scenery and chief points of interest on the Essequibo river and its tributaries, we shall be able to dismiss in a narrower space our notice of the remaining rivers.

The river Demerara is situated between the Essequibo and the Berbice, and is navigable for ships of burden to a distance of about one hundred miles. For thirty miles from the mouth the country on the banks consists of extensive level meadows; then succeed numerous sand-hills; and lastly a hilly region occurs, which gives rise to cataracts and rapids, at a distance of about a hundred miles from the source. The banks of the river present nearly the same appearance as those before spoken of, and the white inhabitants become more and more scattered the farther we ascend the river. The natives have many habits and usages peculiar to this part of the country, and among them we may mention the remarkable mode of catching birds by the "blow-pipe."

A reed grows in Guyana to the length of twelve or fourteen feet, perfectly straight and uniform throughout its whole length, hollow, free from knots or joints, of a bright yellow colour, and perfectly smooth inside and out. Another kind of reed or stem also grows there, which is brown, knotted at intervals, and susceptible of a fine polish. The natives collect one of each of these kinds, extract the pith from the larger stem, and insert the reed within it, thus giving strength to the reed. This forms the blow-pipe of the Indian, into which he inserts a short arrow, and applies one end to his mouth, to blow the arrow out. The arrow is about ten inches long, and is made out of the leaf of a species of palm-tree, hard and brittle, and pointed as sharp as a needle. The middle of the arrow is bound round with cotton, to make it nearly fit the tube: one end is scorched, to make it harder, and the other end is poisoned. A quiver is provided which will hold five or six hundred arrows.

With a quiver of poisoned arrows slung at his back, and the blow-pipe in his hand, the bird-hunter advances cautiously to the woody region where the birds are located. When he espies a bird within arrow-distance, he takes a poisoned arrow from his quiver, puts it in the blow-pipe, directs the tube towards the bird, applies it to his mouth, and blows strongly and suddenly through it. Seldom does he miss the object of his aim. If the bird be struck, or if the skin merely be pierced, it is generally dead within three minutes afterwards. The bow and poisoned arrows are also employed by the natives in their search for large birds and quadrupeds.

The river Berbice, which is eastward of the Demerara, was but little known until explored by Mr. Schomburghk, in 1836–7. When this part of the colony was in the hands of the Dutch East India Company, there were settlements on the banks of the river to a distance of

sixty miles from the sea, but now, from various causes, there are but few white inhabitants met with above the town of New Amsterdam. At one spot Mr. S. met with a neat cottage, the proprietor of which (a Dutchman) cultivated rice, and received the travellers very kindly. Farther on he met with a large wood-cutting establishment, belonging to a Mr. M'Cullum, and employing about two hundred Indians and fifty negroes: these men fell the trees, and square the timber. The Indians were kindly treated by their employer, and are said to be excellent working servants, but there are some proprietors of land who act unfairly and ungenerously towards these tribes: they supply an Indian with articles on credit, sometimes to a large amount, provided he is able to work, being aware that the Indian deems himself in duty bound to work for his creditor until the debt is paid: but many wood-cutters use every means to prevent his getting out of debt, by constantly supplying him with more goods and large quantities of rum, whereby the poor Indian is kept in a state of bondage. To lessen this evil, a protector of Indians has been appointed.

The natives pass on the shallow parts of this river in very flat, shallow, light canoes, called woodskins. They are made of a single piece of the tough bark of the *murianara* tree, which grows to a very large size: an incision is made in the bark to the extent required, and it is then removed by driving in wedges: when loosened from the wood the bark is kept open by cross-sticks, and is supported at the extremities upon two beams. Vertical incisions, about two feet asunder, and a few inches in depth are then made, and the parts secured by overlapping. This frail boat, although one man can carry it with ease on his head, frequently holds three persons and a quantity of luggage, in passing through the shallow parts of the Berbice river.

High up the river the party came to a spot where the contracted stream forms an entrance to a natural basin, bordered by hills, and here occurred a fall, not very deep, but of too great rapidity to permit the canoes and boats to be forced up it, which was done in many other instances. The party therefore hauled up, and conveyed the baggage by hand to the head of the fall, but the large canoes, or *corials*, were forced through the rushing water. Hendrick, a courageous Indian, gained onetof the rocks in the middle of the cataract, and seized the end of a boat-rope which was thrown to him. He then carried it to a less dangerous place, to which some of the other Indians had arrived by swimming; and the whole party then drew the corial by main strength up the opposing current. In effecting the same object with another corial Hendrick lost his footing in the middle of the cataract, and was swept away, but being just enabled to grasp tightly a rope thrown out to him, he was fortunately saved.

This part of the river abounds in *kaymans*, or large alligators, animals which appear to be very tenacious of life. On one occasion a kayman was shot, the ball taking off the end of the snout: another ball was lodged in the hinder part of the skull; and after the Indians had beaten the animal till life appeared to be extinct, it was lifted out of the water, and placed in the bow of the corial. When, soon afterwards, the corial had to be drawn up a rapid, the kayman was in the way, and two men took it up, to move it to a more convenient place; but scarcely had they done so when it suddenly leaped into the water. On another occasion, when a kayman had been shot and taken, a piece of the windpipe three inches in length was cut out, to ensure the death of the animal, but it was still found living the next day, and was only finally despatched by piercing the brain with a sharp knife.

Snakes of rather a fearful size are found on the banks of the river. One measuring sixteen feet in length and twenty-eight inches in circumference was seen by the party close to the shore. Hendrick jumped ashore, and dexterously slipped a noose round its head, and was on the point of securing it, when the snake turned round and made a motion as if to dart at him. At this attack all his courage forsook him, and he retreated with precipitation over bushes and rocks into the water. The other Indians stood petrified, and could not be persuaded to put a finger to the rope by which the snake was held. At this juncture a timely shot from one of the party despatched the snake and redeemed the rope.

It was on the 1st of January, 1837, that Mr. Schomburghk, somewhat dispirited at the toils and difficulties which he had encountered, met with that wonderful flower which, at his request, was named after Her Majesty, and which the reader will call to mind as the *Victoria regia*. He says:—

Some object on the southern point of the basin attracted my attention: I could not form any idea of what it might be, and I hurried the crew to increase the rate of their paddling: in a short time we were opposite the object of our curiosity,—a vegetable wonder. All calamities were forgotten; I felt as a botanist, and felt myself rewarded. A gigantic leaf, from five to six feet in diameter, salver-shaped, with a broad rim of a light green above, and a vivid crimson below, rested upon the water: quite in character with the wonderful leaf was the luxuriant flower, consisting of many hundred petals, passing in alternate tints, from pure white to rose and pink. The smooth water was covered with them, and I rowed from one to the other, observing always something new to be admired.

Mr. Schomburghk then proceeds to describe more minutely the botanical features of the flower, but this description we must pass over.

Our travellers espied a large herd of *kairounies*, or Indian hogs, and, as their stock of provisions was getting low, an attack on the herd was resolved on. The hogs were wallowing in a pool of muddy water, one being left as sentinel to give the alarm if an enemy approached. This sentinel was fired at, and immediately the whole herd of two hundred scampered off in an opposite direction. The party dispersed in various directions to shoot some of the hogs during their retreat, but it so happened that the Indians unintentionally drove the herd towards the spot where Mr. Schomburghk was standing alone.

I heard a rushing noise (he says) like a whirlwind, approaching through the bushes: the peculiar growl, and that awful clapping of the teeth, did not leave me long in doubt as to its cause: it was evident that the herd had divided, and were coming directly towards me. I stood alone, unarmed, and had not even a knife to defend myself. I know not yet how I climbed the lower part of a mora tree, when by they rushed, their muzzles almost sweeping the ground, and their rough bristles on the back standing erect. They came past like a whirlwind, and before I had recovered from my astonishment I heard them plunge into the river, and swim over to the opposite bank.

When the party had explored the river Berbice almost to its source, they returned, and on approaching near the settlements Mr. Schomburghk lost by death an enterprising young companion who had shared his dangers and toils. On February 11 this gentleman, Mr. Reuss, suddenly became low-spirited, and said "he knew he should die young." On the following day the corials had to be directed down a rapid and cataract by the skill of some of the Indians. Mr. Reuss determined to make one of the party, against all the solicitations of Mr. Schomburghk. The corial was launched down the rapid, Mr. Reuss standing when he ought to have been seated, and, by some bad management the corial became upset, and all the crew precipitated into the river. Mr. Reuss was drowned, and his companions had the melancholy task of interring him on the banks of the river.

The travellers had not seen a human habitation of any kind for the space of two months, when, on the 20th February they arrived at some Indian huts. From thence they proceeded to the European settlements, and finally came to New Amsterdam, from whence they started.

We now conclude our notice of British Guyana. There are one or two other rivers which we have not particularly noticed, but the notable objects presented by them so nearly resemble others which have already engaged our attention, as to preclude the necessity for farther description. The reader will gather from these details, that British Guyana is a beautiful and fruitful country, abounding in animals and plants of various kinds,—thinly inhabited by dark-skinned natives, who are generally of a peaceful character,—and by colonists at a few towns situated near the mouths of three or four rivers flowing northward into the Atlantic.

DO STONES GROW?

THE opinion that stones grow and increase in size is very popular, and very erroneous. We hear it stated by many persons with all the certainty of a well attested fact, and yet there are few vulgar errors which rest upon a more flimsy foundation.

A writer, who, by the ease and familiarity of his style first attempts to render a very difficult subject popular, often runs the risk of diffusing error as well as truth. M. de Tournefort, the immediate predecessor of Linnæus, deprived botany of much of its forbidding aspect, and greatly promoted its study by a new system of classification and a new and easier method of description. In 1702, after returning from his travels in the Levant, he wrote an account, among other objects, of the botanical productions which he had examined during his travels. In surveying the labyrinth of Crete he observed that the names which visitors had engraved upon the rock were not formed of hollow but of prominent letters, like basso-relievos. He supposes that these letters were at first hollowed out by knives; that the hollows have since been filled up by the growth of the stone; and hence he indulges in the fancy that stones increase in size like the productions of the vegetable world which constituted his favourite study.

The pleasing style of Tournefort's Travels caused his book to be much read, and hence arose the popular error that stones grow. It would be satisfactory to be well assured that the letters were at first hollowed, before attempting to account for their prominency; but assuming the fact to be as he states it, we proceed to state a few of the conditions necessary to the growth or enlargement of matter.

The various objects of the material world are conveniently arranged into two great classes, the organized and the unorganized: the former includes animals and plants, and the latter minerals. In animals and plants we observe a system of organs, gradually rising from a very simple to a very complex method of arrangement, and destined to the performance of certain *vital* functions. In minerals we find none of these organs, and consequently there cannot exist in them the vital principle which is the distinctive character of the former. We readily admit also that vitality was not present in minerals during their formation; but the slightest trace of organization in any natural body is a clear proof that life does exist or has existed in it. Unorganized bodies are made up of elementary atoms, or of proximate principles, in which elementary atoms are united in certain definite proportions. When these are brought together in a gradual manner by the force of affinity from a state of solution or of fusion, they assume various geometric forms called crystals. These crystals can only increase in size by the addition of other atoms to their *external* surfaces, and it often happens that this increase goes on to an indefinite extent; the original crystalline form being constantly maintained. Should the circumstances under which these crystalline forms are produced cease to operate, the atoms may still unite and form shapeless masses which, however, possess the same definite character of composition as if they had been recently crystallized. Rocks and stones, the ocean and the atmosphere, are mixtures of simple minerals, or of the simple substances of which the latter are formed. The earth itself, and probably the various heavenly bodies, are regarded as large masses of mineral or unorganized matter.

Although an animal or a plant is in substance composed of the same simple atoms as those which compose minerals, yet they are eminently distinguishable from the latter by the manner in which they increase in bulk. The various organs of such bodies are not, as in the structure of minerals, similarly composed throughout; they increase by the assimilation of food, which being received into the system through certain cavities or vessels, is formed by peculiar processes into specific compounds, adapted to the nutrition and growth of the animal or plant. Now, in the example furnished by Tournefort, the protuberancy of the characters cannot be called growth, nor, as he terms it, vegetation; because it is, in no respect, effected by a process similar to the vegetation of a plant. Vegetation supposes vessels containing fluids and growth by expansion; but would any one contend for a moment for the existence of vessels in a stone; of fluids moving in them; or of the different parts expanding and swelling like the branch or trunk of a tree? Even the fact, as stated by Tournefort, proves nothing; for he does not pretend that the rock itself is increasing in bulk, but only that a few insignificant hollows have become filled up with fresh stony particles which project a little beyond the general surface of the rock. This filling up may be explained by referring to the process by which stalactites are formed. When water saturated with calcareous matter is exposed to the air, the water evaporates, and the calcareous earth remains behind and gradually hardens into stone.

The popular notion that stones grow, has led to the practice of watering coals and keeping them wet for a long time before they are used. The effect of this practice is simply this: When the wet coals are thrown upon the fire they cannot burn until the greater part of the moisture is converted into steam, and thus dissipated; a large portion of the heat which would otherwise warm the apartment is now lost; for it combines with the water to form steam, which, with the smoke, ascends the chimney instead of radiating into the apartment.

The distinctions which we have pointed out between organized and unorganized matter will be sufficient to show that a negative answer must be given to the question, "Do stones grow?" The precise limits between minerals and organized bodies may be considered as ascertained; but the line of demarcation between the two kingdoms of organized nature is by no means precise. However simple the questions may appear, "What is a plant?" and, "What is an animal?" naturalists have found great difficulty in answering them in such a manner as to satisfy all the conditions under which organized matter is found. For a long time it was considered satisfactory to define a plant as "a being with life and without the power of locomotion," and an animal as "a being possessing life and the power of locomotion;" but such definitions lost their value when it was found that some of the lower tribes of animals had not the power of moving about from place to place; and that some plants could do so to a certain extent. Perhaps the most constant distinction between these two great classes is the presence in animals of internal *sacs* or *stomachs* for the reception of food; organs with which plants are not furnished.

There is no difficulty in admitting that plants, in common with animals, possess vital energy, which distinguishes them from inert matter, and displays itself by its effects. If we would extend the inquiry beyond the examination of these effects, and seek to know what *vitality* is, we are soon brought to a pause, and admit the inefficiency of our means to penetrate those mysteries

which the Almighty has concealed from us. We see that vitality and organization accompany each other; but vitality does not depend on mere structure; it is not produced by respiration alone, although this process seems necessary to it; it is not heat, for this is only an effect of vitality, although a certain degree of temperature favours it; our most refined chemistry scarcely leads us one step nearer to the cause of this wondrous principle; vitality resists those combinations in organized bodies which so unerringly occur when life is extinct. The flights of imagination as well as the sober reasonings of philosophy, fail to inform us of its nature: we can only regard its effects in silent admiration, and think of it as that divine emanation from the Almighty, first communicated to man when "He breathed into his nostrils the breath of life."

ON CHESS.

XI. CHESS-WRITERS AND PLAYERS, (*continued.*)

CHESS-PAWN, AS DESIGNED BY FLAXMAN.

Bright in the front the dauntless soldiers raise
Their polished spears: their steelly helmets blaze.
Prepared they stand, the daring foe to strike,
Direct their progress, but their wounds oblique.

SIR WILLIAM JONES.

IN the early part of the eighteenth century Captain Joseph Bertin obtained a distinguished rank among chess players. He seems intitled to the merit of having invented the "Three pawns' gambit:" which being afterwards adopted by the celebrated player Cunningham, it was named by Philidor "the Cunningham gambit," by which term it has since been known; but, as Mr. Walker remarks, from its construction involving a sacrifice of three pawns, it is more correct to term it the *Three pawns' gambit.* In 1735 Captain Bertin published a small work, entitled "The noble Game of Chess." "Printed for the Author, and sold only at Slaughter's Coffee-house, in St. Martin's Lane." This work contains the laws, twenty-six games, and twelve endings. Among his rules, the author makes a remark which every chess player will appreciate:—"I wish I could give rules to avoid oversights."

Mr. Cunningham, the critic and editor of Horace, a gentleman of taste and learning, had moreover the reputation of being the first chess-player in Europe. His acquirements gained him the friendship of many distinguished persons. It is said that while Lord Sunderland and Mr. Cunningham were at the Hague, they frequently played at chess, and after continuing to play for some time his lordship discovered that if either one before playing was jolted in the carriage, in passing over the rough streets of the Hague, he was generally the loser. For this reason his lordship discontinued going to Cunningham, but for some time sent for him. Under this new arrangement Mr. Cunningham found, to his no small astonishment, that he lost most of his games; and when the plan was at length revealed, he insisted that the visits should be reciprocated. This new arrangement is said to have restored the former ratio of success between them; but, as was remarked to Mr. Twiss, those who believe in this anecdote must think that the head of a chess player, before he plays, must be moved as carefully as a bottle of old port before it be decanted.

During Mr. Cunningham's residence at the Hague, a German prince, having heard of his great skill at chess, sent him an invitation to go and play on a certain day. Mr. Cunningham, who had acquired an European reputation in chess, did not choose to risk it against a stranger, and therefore asked Mr. Ogilvie, a Scottish gentleman in the Dutch service, to pay a visit to the prince as Mr. Cunningham's pupil. This was agreed to, and Mr. Ogilvie waited upon the prince with a note from Mr. Cunningham to the effect that he could not avail himself of the honour of accepting the prince's invitation for the hour named, but that he had sent one of his pupils to attend in his place, and in the event of his being beaten, Mr. Cunningham would himself attend and play with the prince. Mr. Ogilvie beat the prince in every game; which so greatly mortified him, that, thinking the master would vanquish him still more easily than the pupil, left the Hague on the following morning without even waiting to see Mr. Cunningham.

This distinguished player died in his native country, Scotland, in 1732, more than eighty years of age.

The next player of eminence is Philippe Stamma, who styles himself "native of Aleppo in Syria, and interpreter of the oriental languages to the King of Great Britain." He published at Paris in 1737 a small work containing a hundred situations or ends of games: many of these are very instructive, and ought to be known by every chess student: others, says Sarratt, there is every reason to believe, never occurred in the course of a game, and it may be doubted whether they could occur. We may add that the same remark also applies to many of the chess problems of our own day.

In an edition of this work in French, published by Stamma at the Hague in 1741, and dedicated to Lord Harrington, we find the following amusing anecdote among the rules and cautions which he gives to the chess student:—

Be very careful how you capture a piece which your adversary offers you for nothing: for he intends either to win one of your superior pieces, or to give you check-mate. This stratagem is frequently practised among good Arabian players.

It is related that a young man of this country, still under paternal authority, having learnt the game of chess, took so much pleasure in it that he neglected everything else. His father having often reprimanded him without effect, became at last so angry that he threatened one day to kill him. The son fell on his knees, demanded pardon, and stated that this game was more useful than his father seemed to think it; but that he would continue to play no more. After a moment's reflection the father demanded the use of such a game, for he could see none, except it were to encourage idleness. "My father," replied the son, "this game teaches me many things that will be very useful to me during my future life. If for the good of my country I were required to go to the wars, this game teaches me how to fight with advantage. If I were on a journey, and robbers were to attack me, I should know better how to defend myself than one who has not acquired skill in this game."

"Tell me how this is possible," said the father. "You must put me to the proof;" responded the son. The father did so: he sent his son on a distant journey, with a large sum of money to buy merchandise.

When the young man was on his road, the father sent four men after him to rob him. When the son found himself opposed to these robbers, he dismounted quickly, abandoned his horse, and taking refuge behind walls and hedges, escaped. He then accomplished the object of his journey, and succeeded in bringing his merchandise safely home.

He then related to his father what had happened. "As

soon as I was attacked," said he, "I bethought myself of an expedient frequently adopted at chess, viz., to sacrifice my horse to save my life and my money; in the same way as at chess I sometimes sacrifice my knight, in order to save my king or my queen."

The father was so much pleased with the skill and address of his son, that he not only forgave him, but determined to learn the game. This little story, says Stamma, is far more pleasantly related in the Arabic, in which language the knight is called the horse.

Stamma was in London in 1745, and published an improved edition of his treatise, which has since been edited with notes by Mr. Lewis. In 1747, Stamma tried his skill against Philidor in a match of en games; Philidor giving him the move, and allowing a drawn game to be a lost one. With these advantages Stamma won only two games, of which one was a drawn game.

As it is our intention to *conclude* these brief notices of chess players and writers with an account of Philidor, we proceed to notice a few of the principal satellites which, during a considerable portion of the last century, hovered round the greatest luminary that ever threw lustre on the science of chess.

In 1750, a treatise entitled "Practical and Theoretical observations on the Game of Chess," was published at Modena. "The author," says Sarratt, "chose to conceal his name, and it is difficult to assign a satisfactory reason for his diffidence, for it is unquestionably a publication of great merit and real utility." For many years the author of this book was referred to as "The Anonymous Modenese," but it is now known that Dr. Ercole del Rio was the author. In 1820, Mr. Bingham published "The incomparable Game of Chess developed after a new method of the greatest facility, from the first elements to the most scientific artifices of the game." This high sounding title, which, like all such, promises more than it performs, is applied to a work which professes to be a translation from the Italian of Del Rio, whereas the real author is Domenico Canonico Ponziani, an advocate in the Ecclesiastical Courts, and a friend of Del Rio, who was an advocate in the Civil Courts. Mr. Bingham has translated the third edition of this book, published at Venice in 1812, which is greatly inferior to the second, published at Modena in 1782, the third, as Mr. Cochrane thinks, being probably a reprint of the first. In the advertisement to the second edition, Ponziani is distinctly stated to be the author, and is said to have been assisted by his friend Del Rio, in the composition of the work.

The work of Del Rio received a commentary from the labours of Lolli in 1763. This commentary, (a folio volume of 632 pages,) "like that of Coke upon Littleton, or of a Dutch scholiast upon a classic, exceeds a hundred-fold the bulk of the original work." The size of this book, adds Mr. Cochrane, was, on its first publication, ridiculed in Baretti's *Frusta Literaria*. It is, however, the most complete and valuable treatise on chess which has hitherto appeared. This high praise was given by Mr. Cochrane in 1822, and although many valuable works on chess have appeared since that time, Mr. Walker, in the third edition of his excellent treatise, (1841,) does not hesitate to pronounce Lolli's "the most *classical* work on chess extant."

We conclude the present article with an amusing anecdote, related of the Duke de Nivernois:—

When this accomplished nobleman was ambassador to England, he was going to Lord Townsend's seat, at Rainham in Norfolk, on a private visit, *en déshabille*, and with only one servant, when he was obliged by a very heavy shower to stop at a farm-house in the way. The master of the house was a clergyman, who, to a small curacy, added the care of a few scholars in the neighbourhood; which in all might make his living about eighty pounds a year: this was all he had to maintain a wife and six children. When the duke alighted, the clergyman, not knowing his rank, begged him to come in and dry himself; which the other accepted, by borrowing a pair of old worsted stockings and slippers, and warming himself by a good fire. After some conversation, the duke observed an old chess-board hanging up; and, as he was passionately fond of the game, he asked the clergyman whether he could play. The latter told him, that he could play pretty tolerably; but found it difficult in that part of the country to get an antagonist. "I am your man," says the duke. "With all my heart," answers the clergyman; "and if you will stay and take pot-luck, I will see if I cannot beat you." The day continuing rainy, the duke accepted his offer; when his antagonist played so well, that he won every game. This was so far from fretting the duke, that he was pleased to meet a man who could give him so much entertainment at his favourite game. He accordingly inquired into the state of his family affairs; and making a memorandum of his address, without discovering his title, thanked him, and departed.

Some months elapsed, and the clergyman thought no more of the matter, when, one evening, a footman rode up to the door, and presented him with a note.—"The duke de Nivernois' compliments wait on the Rev. Mr. ———; and as a remembrance for the good drubbing he gave him at chess, begs that he will accept the living of ———, worth 400*l.* per annum; and that he will wait upon his Grace the Duke of Newcastle on Friday next, to thank him for the same."

The good clergyman was some time before he could imagine it to be any more than a jest, and hesitated to obey the mandate; but as his wife insisted on his making a trial, he went up to town, and, to his unspeakable satisfaction, found the contents of the note literally true.

ON THE PRESERVATION OF TIMBER.

When we consider how large a quantity of timber is necessary to the construction of a ship, and when it is stated that the average durability of the vessels of the Royal Navy does not exceed fifteen years, we readily admit the vast importance of any successful means of counteracting those deteriorating influences to which large combinations of wood-work are peculiarly liable.

Vegetable matter, in common with all organic substances, is subject to decomposition and decay, as soon as life becomes extinct; and although the process is comparatively slower in its commencement and progress in vegetable than in animal matter, it is not under ordinary circumstances, the less certain. During the existence of a plant, its various organs, under the influence of the mysterious principle of life, perform their respective functions in a manner similar to that of which we are more readily conscious in the animal frame. The plant absorbs its food from the soil and the surrounding air; it digests that food under the influence of respiration, and prepares rich and nutritive juices which circulate throughout its whole vegetable frame, and deposit materials of growth wherever they are wanted; it sheds its leaves in Autumn, undergoes a season of torpor, and again becomes active and vigorous: thus it is clad in fresh leafy honours in the following Spring. All this is the effect, or rather the result, of vitality. The plant dies; and then its constituent parts gradually assert their individual existence, and resume their original affinities. Some pass into the air; some form new compounds; and others, which during the life of the plant ministered to its healthy action, now work energetically and destructively on each other: so that the original mass gradually decomposes under the influence of various causes. The first step to decay is a process of fermentation, which is more or less rapid, in proportion as heat and moisture are more or less present. In the absence of damp air, even the vegetable mass will of itself supply moisture; for, according to Count Rumford, the best seasoned timber retains one-fourth of its weight of water. A certain extent of moisture is

essential to vegetable fermentation; but a complete saturation appears inimical to it. A temperature not so low as to produce freezing, nor so high as to produce rapid evaporation, is also favourable to it. The humidity of the air in ships, and the difficulty of obtaining a free circulation of air, contribute greatly to this fermentative process.

The chemical constitution of the vegetable kingdom yields to analysis only three or four ultimate elements, viz., oxygen, hydrogen, and carbon; and sometimes nitrogen. The most active agent in the process of decomposition is the oxygen contained in the dead plant, whether such decomposition proceed under the rapid influence of fermentation, or be produced more slowly by the operation of the law which renders decay the necessary consequence of organization. As soon as the tree is felled the oxygen begins to be liberated and to act upon the woody fibre, combining with its carbon and producing carbonic acid gas. The tenacity of the several parts is thus gradually destroyed. After timber is felled, and during the process of seasoning, a gradual diminution of strength may be remarked. The effect, however, of seasoning is to deprive the wood of superabundant moisture, and of those vegetable juices which would otherwise induce a rapid decomposition.

In addition to the natural decay of timber, the decomposition is often accompanied by the apparently spontaneous vegetation of parasitical fungi, inducing a species of decay to which the term "dry rot" is applied, probably in consequence of the attendant phenomena; the wood being converted into a *dry* friable mass, destitute of fibrous tenacity. It is uncertain whether the seeds of these fungi exist in a dormant state in the juices of the timber, and wait only until the first stages of decomposition furnish them with a nidus favourable to their growth; or whether they float in the atmosphere and settle in places favourable to their vegetation. It is found, however, that badly seasoned timber is peculiarly subject to this species of decay; and hereby the former of the two suppositions just advanced is favoured.

From the moment when timber is felled the process of decay commences, and although so slowly in many cases that we are not conscious of it, yet there is a limit to the existence of the most durable articles of wood, however carefully preserved. Dryness, cleanliness, a free circulation of air, or the entire exclusion of it, are among the best checks to vegetable decomposition; while damp accumulations, and a vitiated atmosphere, rapidly induce it.

Unseasoned timber should never be used in ship-building, and the best seasoned timber should be used only in a dry state. Diseased and decayed portions of the wood should be cut out, together with the sap-wood, which, being more soft and porous than the spine, is more liable to fermentation.

The iron fastenings used about timber frequently cause its premature decay. Iron under the influence of moisture becomes rusty,—that is, oxygen, either from the air or from the wood itself, unites with the metal, forming an oxide, which, in its turn, acts upon the woody fibre, and gradually destroys its tenacity. The iron is further subject to attack from the acid juices of the wood: this effect, however, varies in different woods. Oak contains a smaller proportion of oily or resinous particles than many other kinds of wood; and, in addition to the usual vegetable acid common to most woods, oak contains an acid peculiar to itself, called *gallic* acid: in teak, on the contrary, the quantity of acid is not only smaller, but the resinous particles are very abundant, and these form a sort of protecting covering to the iron fastenings. Mackonochie states, on the authority of the shipping built in India and used in the India trade, that the average duration of an iron-fastened teak ship is thirty years; and that it is a misapplication of expense to use copper fastenings with teak, as the additional advantage gained is not at all commensurate with the additional expense. But it is different with oak: the action of oak on copper is by no means so destructive as on iron, and the reaction of the metal on the wood is not so destructive.

The methods which have been from time to time adopted for the preservation of timber are so numerous that a slight sketch of them would probably fill a good-sized volume. We will name a few of the most successful, and terminate this notice with a description of the method now in practice.

Mackonochie recommends all the iron fastenings to be provided with a protecting paint, and to impregnate the timber with some oily preparation, which he proposes to effect thus: the wood is to be placed in a steam-tight chamber, and subjected to the action of steam, by which the air will be expelled from the timber. Then by condensing the steam, and repeating the process until all the elastic fluids are withdrawn from the wood, and its juices converted into vapour, the wood becomes freed from them; and if plunged into oil, and subjected to atmospheric pressure, all the internal cavities of the wood will be filled with oil. In this way Mackonochie had in daily use a steam-chamber capable of containing twenty or thirty planks of timber, forty feet long, in which, while the planks were steaming, to render them flexible, they were impregnated with teak oil. He says the oil may easily be procured from the chips and saw-dust used for the fuel of the steam-boilers; for it has been ascertained that Malabar teak contains such a quantity of oleaginous (oily) or terebinthinous (turpentine) matter, that the chips from the timber and planks of a ship built of it will yield, by a proper process, a sufficient quantity of tar for all its own purposes including the rigging; and that, although oak timber does not contain so much of these substances, the chips of the fir alone consumed in the Royal Navy, would be more than sufficient to supply tar to saturate the oak.

There have been many other proposals to saturate timber with different substances; the most successful of which, up to the process of Mr. Kyan, was that of M. Pallas, whose plan was to saturate the timber in a solution of sulphate of iron, and then precipitate the salt by means of lime-water. About the year 1822 Mr. Bill produced samples of timber impregnated throughout with a substance resembling asphaltum. These samples were subjected to a trial of five years in the dry-rot pit at Woolwich, and withstood the fungus-rot perfectly. Sir John Barrow recommends kreosote, which he says "in a vaporous form penetrates every part of the largest logs, and renders the wood almost as hard as iron,—so hard as not easily to be worked."

Mr. Kyan's plan, now so universally adopted, is to soak the timber in a solution of bichloride of mercury, commonly called corrosive sublimate.

Aware of the established affinity of corrosive sublimate for albumen, Mr. Kyan applied that substance to solutions of vegetable matter, both acetous and saccharine, on which he was then operating, and in which albumen was a constituent, with a view to preserve them in a quiescent and incorruptible state; and obtaining a confirmation of his opinions by the fact, that during a period of three years the acetous solution, openly exposed to atmospheric air, had not become putrid, nor had the saccharine decoction yielded to the vinous or acetous stages of fermentation, but were in a high state of preservation, he concluded that corrosive sublimate, by combination with albumen, was a protection against the natural changes of vegetable matter. He conceived, therefore, if albumen made a part of wood, the latter would be protected by converting that albumen into a compound of protochloride of mercury and albumen; and he proceeded to immerse pieces of wood in this solution, and obtained the same result as that which he had ascertained with regard to the vegetable decoctions.——BIRKBECK.

It having been found that the precipitate caused by the Kyanization was soluble in salt water, Sir William Burnett has lately substituted chloride of zinc for corrosive

sublimate, and the resulting compound which this forms with the albuminous portion of the wood, effectually resists the action of salt water.

THE CADDIS, OR SPRING FLY.

GREAT is the variety of insects to be observed at this season of the year, in the vicinity of pools and shallow streams of water. The labours of naturalists have taught us to distinguish many of these beautiful forms, and to refer them to their respective families; but how impossible does it appear for an ordinary observer to attain to more than a very superficial acquaintance with them, or to view without bewilderment the diversified shapes and colours of aquatic insects only. Among their numerous tribes, few can be found more interesting to the angler, than the may-flies and caddis-flies which form some of his most important living baits: these insects are highly curious in their larva state on account of the singular nature of the covering with which they invest themselves. Some particulars relative to the *Phryganea* or caddis-fly will doubtless prove acceptable to many of our readers.

The larva of the caddis insect may be seen crawling upon subaquatic plants, or lying passive at the bottom of our clear streams, enclosed in a case of its own construction, the materials of which are very different in different species. In many popular descriptions of insects caddis-worms are spoken of as constituting but one species, and as selecting indifferently from the materials around them, those best adapted to form a protection to their bodies. The Linnæan genus Phryganea, has, however, been found to contain about two hundred British species, and it is little doubted by our best authorities but that each of these has its own method of working, and consequently its own particular form of case. Izaak Walton was not ignorant of this, for we find him speaking in his chapter on baits, of "divers kinds of *cadis* or *case-worms* that are to be found in this nation, in several distinct counties and in several little brooks that relate to larger rivers." Respecting these varieties of caddis he has many directions to give, and of three of them he enters into a particular description. The first he calls *a piper*, "whose husk or case is a piece of reed about an inch long, or longer, and as big about as the compass of a two-pence." This description of caddis-worm is commended by the worthy angler as a choice bait for chub or chavender, or indeed for any great fish. "There is also," he continues, "a lesser cadis-worm, called a *cock-spur*, being in fashion like the spur of a cock, sharp at one end; and the case or house in which this dwells is made of small husks and gravel and slime most curiously made of these, even so as to be wondered at, but not to be made by man, no more than a kingfisher's nest can, which is made of little fishes' bones, and have such a geometrical interweaving and connexion as the like is not to be done by the art of man. This kind of cadis is a choice bait for any float-fish. There is also another cadis, called by some a *straw-worm* and by some a *ruff-coat*, whose house or case is made of little pieces of bents and rushes and straws and water-weeds, and I know not what; which are so knit together with condensed slime, that they stick about her husk or case not unlike the bristles of a hedge-hog."

The faculty is indeed worthy of our admiration which enables these little worms to provide for their own safety at a period of their being, when, their bodies being very soft and tender, they would be exposed to more than ordinary danger. The cases of all caddis-worms have one feature in common, that is, they consist of a cylindrical tube open at both ends. Some of these tubes are simply formed of a slender and narrow bit of grass, which is rolled in a beautiful spiral direction; others are concealed by a drapery of leaves falling over them in a natural and graceful manner; and others are entirely covered with shells, some of which occasionally contain living snails fixed in that position without the power of moving. The worm keeps possession of its case by means of two hooks situated at the extremity of the body, and so firmly do these hooks maintain their hold, that it is almost impossible to separate the insect from its case without injuring it. The caddis-worm has a long body, and the legs, six in number, are situated on the first three segments near the head. These are the only portions which are generally exposed in walking, and they differ from the rest of the body in being firm and hard and little liable to injury. Mr. Rennie made repeated experiments with caddis-worms to ascertain their mode of building. He deprived them of their coverings and furnished them with materials for constructing new ones, watching their proceedings throughout. He describes them as working at the commencement in a very clumsy manner, attaching a great number of chips to whatever materials may be within their reach with loose threads of silk, and thus surrounding themselves with materials many of which are never used in the perfect building. Unskilful as their efforts may at first appear, there is much wisdom in this aggregation of all the substances within their reach, before their dwelling is actually commenced; for when these preparations are completed, they are able to devote their whole attention to the building, and to select the requisite materials from the heap close at hand. The natural cement used by the caddis-worm to unite together the rushes, sticks, stones, &c., of which its house is composed is said to be superior in standing water, to *pozzolana*, the celebrated cement prepared of volcanic earth, or larva. As soon as the dwellings are sufficiently advanced, the larvæ shut themselves up in them and do not again protrude more than the half of their bodies to procure materials. It is not to be supposed that the caddis-worm is regulated in its choice of a proper covering for its body, simply by the instinct of self-preservation from danger: this little creature has an instinctive knowledge that when the covering is made of stones, sticks, or shells glued together, the dwelling, owing to its specific gravity, remains at the bottom of the water, where the food of the species inhabiting these kinds of houses is mostly to be found; and again, other kinds of caddis are endued with instinct to choose materials that shall be lighter than water, to float on the top that they may seek their food from thence.

When the larvæ have attained their full size, they prepare for the change they are about to undergo, into the pupa state. In the first place, they make their cases secure from being carried away by the stream: this they accomplish by spinning threads from their bodies, and attaching them to the case, and also to some large stone. They likewise secure the mouth of the case from the entrance of insects by a beautiful net-work of these threads, the meshes of which are sufficiently close to exclude extraneous substances, but yet allow a free passage to water. This grating, or net-work, consists of a small, thickish, circular lamina, of brown silk, becoming as hard as gum, which exactly fits the aperture of the case, and is fixed a little within the margin. It is pierced all over with holes disposed in concentric circles, and separated by ridges which go from the centre to the circumference, but often not quite so regularly as the radii of a circle, or the spokes of a wheel. These radii are traversed again by other ridges, which follow the direction of the circles of holes; so that the two kinds of ridges crossing each other form compartments, in the centre of each of which is a hole. When the larva sheds its skin, it appears for a time as a quiescent pupa, inclosed in a distinct case: the head, however, is furnished with a pair of curved mandibles, which appear to serve no other use than that of making a

passage through the open-work grating of silk at the time the insect is about to assume its perfect state. When this time arrives the insect is endowed with power of motion far greater than are possessed by any other incomplete pupa; so that it not only cuts through the grating of silk, but creeps out of the case, leaves the water, and, throwing off its skin, appears as a caddis-fly.

The character of the tribe of insects to which the different species of caddis-fly belong, are as follows:—the mouth nearly obsolete, the mandibles being either entirely wanting, or minute and membranous, as are also the under jaws and lips; the palpi are however present, the posterior wings are generally larger than the superior, and folded longitudinally when at rest; the eyes are prominent and globular; the legs are long and slender. The whole insect is of a small or moderate size, and generally of an obscure pale brownish colour. The different species are found flying, chiefly after sunset, about streams, ponds, &c., and are very similar to each other in general appearance. Like the may-flies, these insects appear in successional groups, and though they are commonly called Spring-flies, some of their species are to be seen even in the autumnal season, thus affording food for fishes, birds, &c., all through the Summer months. The most prominent variety of caddis-fly is the *Phryganea grandis*, or stone-fly of anglers. Cotton, the friend and disciple of Walton, gives a description of this insect as follows:—"His body is long and pretty thick, and as broad at the tail almost as in the middle: his colour is a very fine brown ribbed with yellow, and much yellower on the belly than the back: he has two or three whisks also at the tag of his tail, and two little horns upon his head; his wings when full grown are double, and flat down his back, of the same colour, but rather darker than his body, and longer than it, though he makes but little use of them, for you shall rarely see him flying, though often swimming and paddling with several feet he has under his belly, upon the water, without stirring a wing." This fly is much recommended by anglers as a bait both for trout and grayling, but is more successfully used late in the evening than at mid-day. Some of the caddis-flies are remarkable, like certain moths, for their long antennæ, and these are often actively employed when the insects are at rest. These organs have been observed moving about in all directions, as if by their means the fly was exploring everything that occurred in its vicinity. Caddis-flies may be distinguished from the lesser moths by the curiously wrought reticulated structure of their wings, generally destitute of the powdery appearance of the moth; also by their palpi, or feelers, and by the stemmata on the top of their heads.

THE SPRING FLY

FORGET-ME-NOT,

OR MOUSE-EAR-SCORPION-GRASS,

(*Myosotis palustris.*)

THIS beautiful little flower, which enamels the brinks of our rivers with its corollas of celestial blue, has become celebrated by a German tale, full of melancholy romance. It is related, that a young couple, who were on the eve of being united, whilst walking along the banks of the Danube, saw one of these lovely flowers floating on the waves, which seemed ready to carry it away. The affianced bride admired the beauty of the flower, and regretted its destiny, which induced the lover to precipitate himself into the water to secure the flower. He had no sooner done so, than he sank into the flood, but making a last effort, he threw the flower upon the shore, and, at the moment of disappearing, exclaimed: *Vergiss micht nicht;* since which time this flower has been made emblematical, and taken the name of "Forget-me-not."

The *Myosotis palustris* is seen nowhere in greater perfection and abundance, than on the banks of a stream in the environs of Luxembourg, which is known by the name of the Fairies' Bath, or the Cascade of the Enchanted Oak. The romantic banks of this stream are covered with these pretty blue flowers, from the beginning of July until the end of August, and being reflected in the pure waters, appear more numerous than they really are. To this favourite spot the young girls often descend from the ramparts of the town to spend the leisure hours of their holidays in dancing on the borders of this stream, where they are seen covered with the flowers which the waters afford them. The stream is called the Cascade of the Enchanted Oak, from the circumstance of the spring's escaping, with a murmuring noise, from the root of an oak, of great antiquity.

For some years past this little flower has been cultivated in France with the greatest care, and when sent to the Parisian markets, it finds a more ready sale than any exotic plant. The pots being filled with young cuttings, that readily take root and blossom, present such a mass of these delicate little flowers, as must surprise those who have not seen them thus treated.

The generic name of this plant is derived from that given it by the ancients, who called it Mouse-ear, from the form of the leaves; and the French, on the same account, call it *Oreille de Rat*, Rat's-ear. It frequently flowers in May, and continues to give out a succession of blossoms until the end of August. It is increased by separating the roots, and planting them in a moist but free earth; and when planted thickly on the banks or borders of streams or ornamental lakes, it is seen to peculiar advantage. When cultivated in pots, it should be shaded until the slips have taken fresh root; after which the pots should be placed in an open and free air, giving them water when the weather is dry. When in blossom, they may be taken into the house, where these elegant little blue flowers, with their bright yellow eye, cannot fail to attract all the admirers of nature's charms.

We earnestly recommend the cultivation of this little beauty, and particularly so to those cottagers who live near towns, as, by transplanting the trailing branches from their borders into small pots, they would find it profitable to send them to market; for few people would withstand the temptation of purchasing these alluring flowers.

In the Netherlands, it is common to make a syrup of the juice of the myosotis; which is given as a remedy against consumptive coughs.

[PHILLIPS' *Flora Historica.*]

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